



## CA-NV AWWA Water Loss Technical Assistance Program Wave 4 Water Audit Level 1 Validation Document

Water System Name: Yorba Linda Water District

Water System ID Number: 3010037

Water Audit Period: Calendar 2016

### Water Audit & Water Loss Improvement Steps:

Steps taken in preceding year to increase data validity, reduce real loss and apparent loss as informed by the annual validated water audit:

1. Leak Detection Program: Increased from part of year to running program for the entire year.
2. Construction Meters: Non-Routine Audit of meters and re-calibration on change-out. Lock down of all meters.

Utility Provided

### Certification Statement by Utility Executive:

This water loss audit report meets the requirements of California Code of Regulations Title 23, Division 2, Chapter 7 and the California Water Code Section 10608.34 and has been prepared in accordance with the method adopted by the American Water Works Association, as contained in their manual, *Water Audits and Loss Control Programs, Manual M36, Fourth Edition* and in the Free Water Audit Software version 5.

Steve Conklin

Executive Name (Print)

Engineering Mgr.

Executive Position

[Signature]

Signature

9/22/17

Date

## CA-NV AWWA Water Loss Technical Assistance Program

### Wave 4 Water Audit Level 1 Validation Document

#### Audit Information:

Utility: Yorba Linda Water District

PWS ID: 3010037

System Type: Potable

Audit Period: Calendar 2016

Utility Representation: Anthony Manzano, Delia Lugo, Rachel Padillo

Validation Date: 7/26/2017

Call Time: 1pm

Sufficient Supporting Documents Provided: Yes

#### Validation Findings & Confirmation Statement:

##### Key Audit Metrics:

Data Validity Score: 64 Data Validity Band (Level): Band III (51-70)

ILI: 2.16

Real Loss: 41.04 (gal/conn/day)

Apparent Loss: 8.57 (gal/conn/day)

Non-revenue water as percent of cost of operating system: 3.5%

##### Certification Statement by Validator:

This water loss audit report has been Level 1 validated per the requirements of California Code of Regulations Title 23, Division 2, Chapter 7 and the California Water Code Section 10608.34.

All recommendations on volume derivation and Data Validity Grades were incorporated into the water audit. ☒

#### Validator Information:

Water Audit Validator: Will Jernigan Validator Qualifications: Contractor for CA-NV AWWA Water Loss TAP

Validator Provided

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#	AWWA Water Audit Input	Code	Final DVG	Basis on Input Derivation	Basis on Data Validity Grade
1	Volume from Own Sources	VOS	7	<p><b>Supply meter profile:</b> Volume from own sources includes ten active ground water wells each equipped with their own meters. 11th well added in 2017.</p> <p><b>VOS input derived from:</b> SCADA reads from production meters as archived.</p> <p><b>Comments:</b> Input derivation from supporting documents confirmed. Exclusion of non-potable volumes confirmed.</p>	<p><b>Percent of own supply metered:</b> 100%</p> <p><b>Signal calibration frequency:</b> Annual.</p> <p><b>Volumetric testing frequency:</b> None.</p> <p><b>Volumetric testing method:</b> n/a.</p> <p><b>Percent of own supply tested and/or calibrated:</b> n/a.</p> <p><b>Comments:</b> No additional comments.</p>
2	VOS Master Meter & Supply Error Adjustment	VOS MMSEA	6	<p><b>Input derivation:</b> No meter error adjustment, only net storage change.</p> <p><b>Net storage change included in MMSEA input:</b> Yes.</p> <p><b>Comments:</b> No additional comments.</p>	<p><b>Supply meter read frequency:</b> Daily.</p> <p><b>Supply meter read method:</b> Automatic logging via SCADA telemetry.</p> <p><b>Frequency of data review for trends &amp; anomalies:</b> Weekly.</p> <p><b>Storage levels monitored in real-time:</b> Yes.</p> <p><b>Comments:</b> No additional comments.</p>
3	Water Imported	WI	7	<p><b>Import meter profile:</b> Potable water is imported to Yorba Linda from MET through three metered connection (one raw water connection is excluded). The import meters are owned and operated by MET.</p> <p><b>WI input derived from:</b> Totalization of volumes per invoices received from exporter.</p> <p><b>Comments:</b> Input derivation from supporting documents confirmed. Exclusion of non-potable volumes confirmed.</p>	<p><b>Percent of import supply metered:</b> 100%</p> <p><b>Signal calibration frequency:</b> Annual.</p> <p><b>Volumetric testing frequency:</b> None.</p> <p><b>Volumetric testing method:</b> n/a.</p> <p><b>Percent of import supply volumetrically tested:</b> n/a.</p> <p><b>Comments:</b> No additional comments.</p>
4	WI Master Meter & Supply Error Adjustment	WI MMSEA	7	<p><b>Input derivation:</b> Left blank in absence of available test data.</p> <p><b>Comments:</b> No additional comments.</p>	<p><b>Import meter read frequency:</b> Continuous.</p> <p><b>Import meter read method:</b> Automatic logging via SCADA telemetry.</p> <p><b>Frequency of data review for trends &amp; anomalies:</b> Weekly.</p> <p><b>Comments:</b> No additional comments.</p>
5	Water Exported	WE	n/a		
6	WE Master Meter & Supply Error Adjustment	WE MMSEA	n/a		
7	Billed metered	BMAC	5	<p><b>Customer meter profile:</b> Sensus iPerl.</p> <p><b>Age profile:</b> Estimated average age of 15-20 years.</p>	<p><b>Percent of customers metered:</b> 100%</p> <p><b>Small meter testing policy:</b> Reactive - complaint based or flagged-consumption testing only.</p>

#	AWWA Water Audit Input	Code	Final DVG	Basis on Input Derivation	Basis on Data Validity Grade
				<p><b>Reading system:</b> AMR, save approximately 1500 meters on manual read (6%) .</p> <p><b>Read frequency:</b> Monthly.</p> <p><b>Comments:</b> Lag-time correction is employed in input derivation. Input derivation from supporting documents confirmed. Exclusion of non-potable volumes confirmed.</p>	<p><b>Number of small meters tested/year:</b> Not quantified, but known to be small.</p> <p><b>Large meter testing policy:</b> Reactive - complaint based or flagged-consumption testing only.</p> <p><b>Number of large meters tested/year:</b> Not quantified, but known to be small.</p> <p><b>Meter replacement policy:</b> Upon failure only, but observations are that this tends to involve meters around 20 years of age.</p> <p><b>Number of replacements/year:</b> ~400 replaced in 2016.</p> <p><b>Billing data auditing:</b> Standard billing QC, plus review of volumes by use type each billing cycle. Financial auditor performs sampling review on select accounts each year.</p> <p><b>Comments:</b> No additional comments.</p>
8	Billed unmetered	BUAC	n/a		
9	Unbilled metered	UMAC	9	<p><b>Profile:</b> Consists of 8 district meters. city and median accounts that are unbilled but still metered. These accounts were included in the billing data base but removed from BMAC analysis.</p> <p><b>Input derivation:</b> Direct from meter readings.</p> <p><b>Comments:</b> Input derivation from supporting documents confirmed.</p>	<p><b>Policy for billing exemptions:</b> Limited to own facilities.</p> <p><b>Comments:</b> No additional comments.</p>
10	Unbilled unmetered	UUAC	5	<p><b>Profile:</b> Unbilled Unmetered Authorized Consumption consists of water used for well pre-start purging, pipeline maintenance and disinfection, tank maintenance and disinfection, reservoir maintenance and disinfection, fire hydrant testing and flushing, fire flow tests, excavator use and sewer cleaning.</p> <p><b>Comments:</b> No additional comments.</p>	<p><b>Comments:</b> Custom estimates &amp; tracking. Limiting factor for DVG is known (albeit small) omission of Fire Dept estimates in inventory / input derivation.</p>
11	Unauthorized consumption	UC	5	<p><b>Comments:</b> Default input applied.</p>	<p><b>Comments:</b> Default grade applied.</p>
12	Customer metering inaccuracies	CMI	2	<p>See BMAC comments regarding meter testing &amp; replacement activities.</p> <p><b>Input derivation:</b> Rudimentary estimate.</p> <p><b>Comments:</b> No additional comments.</p>	<p><b>Characterization of meter testing:</b> Limited (upon request AND consumption flag only).</p>



#	AWWA Water Audit Input	Code	Final DVG	Basis on Input Derivation	Basis on Data Validity Grade
					<p><b>Characterization of meter replacement:</b> Limited (upon failure only).</p> <p><b>Comments:</b> No additional comments.</p>
13	Systematic data handling errors	SDHE	5	<p><b>Comments:</b> Default input applied.</p>	<p><b>Comments:</b> Default grade applied.</p>
14	Length of mains	Lm	8	<p><b>Input derivation:</b> Totaled from GIS based map.</p> <p><b>Hydrant leads included:</b> Yes.</p> <p><b>Comments:</b> No additional comments.</p>	<p><b>Mapping format:</b> Digital.</p> <p><b>Asset management database:</b> In place but separate from GIS system, per 2010 plan.</p> <p><b>Map updates &amp; field validation:</b> Accomplished through normal work order processes.</p> <p><b>Comments:</b> No additional comments.</p>
15	Number of service connections	Ns	9	<p><b>Input derivation:</b> Standard report run from billing system.</p> <p><b>Basis for database query:</b> Location or other premise-based ID.</p> <p><b>Comments:</b> Adjusted field to 1) remove temporary metered connections and 2) utilize annual mean rather than end of year number.</p>	<p><b>CIS updates &amp; field validation:</b> Accomplished through normal meter reading processes.</p> <p><b>Estimated error of total count within:</b> 2%.</p> <p><b>Comments:</b> No additional comments.</p>
16	Ave length of cust. service line	Lp	10	<p><b>Comments:</b> Default input and grade applied, as customer meters are typically located at the property boundary given California climate.</p>	
17	Average operating pressure	AOP	5	<p><b>Number of zones, general profile:</b> 20 zones, with 12 booster stations and a few PRVs.</p> <p><b>Typical pressure range:</b> 30-80, with areas up to 140.</p> <p><b>Input derivation:</b> Output from hydraulic model to get zone averages, then a weighted average across all zones based on connections.</p> <p><b>Comments:</b> No additional comments.</p>	<p><b>Extent of static pressure data collection:</b> Hydrant pressures taken during routine system flushing and/or hydrant testing.</p> <p><b>Characterization of real-time pressure data collection:</b> Basic - telemetry or pressure logging at boundary points (supply locations, tanks, PRVs, boosters).</p> <p><b>Hydraulic model:</b> In place and calibrated within the last 5 years.</p> <p><b>Comments:</b> Governing criteria for DVG is extent of real-time pressure monitoring.</p>
18	Total annual operating cost	TAOC	10	<p><b>Input derivation:</b> From official financial reports – fiscal year.</p> <p><b>Comments:</b> Confirmed costs limited to water only, and water debt service included.</p>	<p><b>Frequency of internal auditing:</b> Annually.</p> <p><b>Frequency of third-party CPA auditing:</b> Annually.</p> <p><b>Comments:</b> No additional comments.</p>

#	AWWA Water Audit Input	Code	Final DVG	Basis on Input Derivation	Basis on Data Validity Grade
19	Customer retail unit cost	CRUC	7	<p><b>Input derivation:</b> Simple rate structure with only a single volumetric rate for water. Sewer charges are based on water meter readings. Sewer revenues are applicable but not incorporated into calculation.</p> <p><b>Comments:</b> Recommend calculating for next audit as total consumptive revenue (water &amp; sewer) divided by Billed Metered Authorized Consumption.</p>	<p><b>Characterization of calculation:</b> Weighted average but not composite of all rates. Input calculations have been reviewed by an M36 water loss expert.</p> <p><b>Comments:</b> No additional comments.</p>
20	Variable production cost	VPC	4	<p><b>Supply profile:</b> Own sources and import supply.</p> <p><b>Primary costs included:</b> Treatment chemicals, supply &amp; distribution power, and purchase costs.</p> <p><b>Secondary costs included:</b> None currently included.</p> <p><b>Comments:</b> No additional comments.</p>	<p><b>Characterization of calculation:</b> Primary costs only. Input calculations have been reviewed by an M36 water loss expert.</p> <p><b>Comments:</b> No additional comments.</p>

### Key Audit Metrics

(~)	VALIDITY	Data Validity Score: 64	Data Validity Band (Level): Band III (51-70)
(#)	VOLUME	ILI: 2.16	Real Loss: 41.04 (gal/conn/day)      Apparent Loss: 8.57 (gal/conn/day)
(\$)	VALUE	Annual Cost of Apparent Losses: 280,182	Annual Cost of Real Losses: 786,745

### Infrastructure & Water Loss Management Practices:

Infrastructure age profile: Average ~40 years.  
every other year around 1-1.5\$M.

Infrastructure replacement policy (current, historic): Routine CIP for renewals on pipe network –

Estimated main & service failures/year: ~12

Extent of proactive leakage management: Annual LD survey activity, in house.

Other water loss management comments: No additional comments.

### Comments on Audit Metrics & Validity Improvements

The Infrastructure Leakage Index (ILI) of 2.16 describes a system that experiences leakage at 2.16 times the modeled technical minimum for its system characteristics. The Data Validity Score falling within Band III (51-70) suggests that next steps may be focused simultaneously on improving data reliability and evaluating cost-effective interventions for water & revenue loss recovery. Opportunities to improve the reliability of audit inputs and outputs include:

- Improved understanding of Supply Meter (Own or Import) Master Meter Error: consider adopting or increasing the rigor of a source meter volumetric testing and calibration program, informed by the guidance provided in AWWA Manual M36 – Appendix A.
- Improved estimation of CMI: consider a customer meter testing program which tests a sample of random meters whose stratification (by size, age, or other characteristics) represents the entire customer meter stock.

When the CA-NV AWWA Water Audit Validator (WAV) program comes online after this year, is the utility planning on having a staff member become certified to perform the Level 1 Validation for future audits? Yes, likely.